NRC FORM 366 (4-95) | U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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WATTS BAR NUCLEAR PLANT - UNIT 1	05000390	1 OF 9

TITLE(4)

Misposition of Emergency Gas Treatment System Handswitches

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
03	26	96	96	-- 010 --	00	04	25	96	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	1
POWER LEVEL (10)	043

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	20.2201(b)		20.2203(a)(2)(v)	X 50.73(a)(2)(i)	50.73(a)(2)(viii)
	20.2203(a)(1)		20.2203(a)(3)(i)	50.73(a)(2)(ii)	50.73(a)(2)(x)
	20.2203(a)(2)(i)		20.2203(a)(3)(ii)	50.73(a)(2)(iii)	73.71
	20.2203(a)(2)(ii)		20.2203(a)(4)	50.73(a)(2)(iv)	OTHER
	20.2203(a)(2)(iii)		50.36(c)(1)	50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iv)		50.36(c)(2)	50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Rickey Stockton, Compliance Licensing Engineer	(423) 365-1818

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
A	BH	HS	W351	NO						

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO				

ABSTRACT (Limit to 1400 spaces, *i.e.*, approximately 15 single-spaced typewritten lines) (16)

On March 26, 1996, with Unit 1 in mode 1 at approximately 43 percent reactor power and generator load at 475 MWe, a system engineer identified that handswitches for both trains of the Emergency Gas Treatment System (EGTS) pressure control isolation dampers were in the A-Auto Standby position. The EGTS is used to process air through high efficiency particulate air (HEPA) filters and carbon adsorbers prior to release to the atmosphere during accident conditions. Normal alignment requires one train to be in the A-Auto position. With the switches in the as-discovered alignment, the EGTS would still function during an accident to maintain negative pressure and filter effluent. However, one train of the system would not have met the flow rate in the required 20 second surveillance time. Upon discovery, TS 3.0.3 was entered. One of the switches was returned to the A-Auto position and TS 3.0.3 was exited. It was discovered that this condition existed since March 17, 1996, which exceeded the Limiting Condition for Operation (LCO) 3.6.9A time for restoring the inoperable train.

The root cause of this condition was determined to be a failure to follow procedure in system restoration following a performance of a Surveillance Instruction (SI). Corrective actions taken included counseling the individual involved in performing the test, a procedure revision to clarify requirements involving SI documentation, and the issuance of guidance stressing alignment of infrequently manipulated critical equipment.

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I. PLANT CONDITIONS

On March 26, 1996, at the time of the event, TVA operators were maintaining the plant at steady state with reactor (Energy Industry Identification System (EIIS) Code RCT) power at 43 percent and generator (EIIS Code TG) load at approximately 475 MWe.

II. DESCRIPTION OF EVENT

A. Event

On March 17, 1996, SI - 0-SI-65-6-B, "EGTS Train B 10 Hour Operation," was started at approximately 0200 Eastern Standard Time (EST). A shift change occurred at approximately 0800 with a new unit operator (NRC licensed) assigned to complete this SI. When the 10 hour run time elapsed, the unit operator used System Operating Instruction (SOI)-65.02, Section 7.2 to shutdown EGTS (EIIS Code BH) Train B. The last step of this section directs the performer to section 5.1 to align EGTS in the "Standby Readiness." However, this section of the procedure was not completed which resulted in the switch (EIIS Code HS), 1-HS-65-83/87 (switch 1-HS-65-81/86 was already in the A-Auto standby position), being left in the A-Auto standby position. Subsequent SI package and control board reviews did not detect the error.

On March 26, 1996, at approximately 0855 EST, the EGTS system engineer was in the main control room performing a periodic walkdown. He discovered that handswitches for both trains of EGTS were in the A-Auto standby position.

B. Inoperable Structures, Components, or Systems that Contributed to the Event

No other structures, components, or systems were inoperable that contributed to this event.

C. Dates and Approximate Times of Major Occurrences

TIME	EVENT
March 17, 1996	
≈0200	Unit operator started the performance of 0-SI-65-6-B for EGTS Train B.
≈0800	Shift change occurred.
≈1400	The new unit operator resumed performance of 0-SI-65-6-B, shutdown EGTS Train B and subsequently left handswitch 1-HS-65-83/87 in the A-Auto Standby position.
March 26, 1996	
0855	EGTS system engineer discovered misaligned handswitches.

D. **Other Systems or Secondary Functions Affected**

No other systems or secondary functions were affected.

E. **Method of Discovery**

A system engineer was visually inspecting the position of EGTS control room handswitches.

F. **Operator Actions**

Upon notification by the system engineer of the switches position, the operators immediately declared entry into Limiting Condition for Operation (LCO) 3.0.3 and repositioned the switches into their correct positions in accordance with Section 5.1, "Standby Readiness," of System Operating Instruction (SOI) - 65.02, "Emergency Gas Treatment System." LCO 3.0.3 was then exited.

G. **Automatic and Manual Safety System Response**

There were no automatic or manual safety system responses.

III. CAUSE OF EVENT

A. **Immediate Cause**

The immediate cause was the misposition of the handswitches.

B. **Root Cause**

The root cause of this event was determined to be personnel error resulting from a failure to follow procedure in EGTS system restoration following the performance of SI - 0-SI-65-6-B on March 17, 1996. Further, reviews of the SI package and the subsequent control board reviews did not detect this error.

IV. ANALYSIS OF EVENT - ASSESSMENT OF SAFETY CONSEQUENCES

A. **Evaluation of Plant Systems/Components**

The WBN EGTS is a safety grade system designed to maintain negative annulus pressure following an accident and to process effluent from the annulus prior to discharge to the atmosphere. The design bases for the EGTS include the following: 1) to keep the air pressure within the Shield Building annulus below atmospheric pressure at all times in which the integrity of the containment is required, 2) to reduce the concentration of radioactive nuclides in annulus air that is released to the environment during a LOCA to levels sufficiently low to keep the site boundary and low population zone dose rates below the 10 CFR 100 values, 3) to withstand the safe shutdown earthquake, and 4) to provide for initial and periodic testing of the system capability to function as designed.

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The EGTS contains two separate control systems to provide redundant control of annulus pressure following a design basis accident which requires EGTS operation These control systems serve to modulate EGTS return flow to the annulus and to the discharge vent to control annulus pressure at the control setpoint. In addition to the modulating control systems, the design incorporates redundant isolation damper (EIIS Code DMP) controls which select the preferred modulating control by opening the preferred flow path and isolating the non-preferred path. Each of these isolation control circuits contain two "arming" logic circuits.

The design of the EGTS control logic assures single failures do not prevent the proper operation of the EGTS system following an accident. The normal configuration is for one of the isolation controls systems to be in automatic while the other is in standby. At the initiation of an accident, the automatic isolation circuit opens the preferred flow path and allows the modulating controls in that path to control the flow. The "arming" logic continues to monitor the annulus pressure for abnormalities. If an abnormal condition is detected, the arming circuits isolate the automatic path and opens the standby path to allow the modulating controls in that path to control EGTS flow. Both trains of EGTS fans (EIIS Code FAN) start on the accident signal. Both trains of modulating controls function from the start of the accident. Operator action within 30 minutes into the accident secures one train of EGTS.

For this event, the initial condition was that both EGTS controls were in standby and neither was in automatic. Therefore, the automatic control was inoperable due to a mispositioned switch. This defeats the automatic opening of the preferred EGTS flow path upon an accident signal. The standby control was operable (actually with this configuration two trains were operable in standby). EGTS would have functioned following the event as if the automatic control had failed (single failure due to operator mispositioning) and the standby would have assumed control. This control point swapover is at a slightly higher pressure in the annulus than the normal control point.

An evaluation, assuming no EGTS control until the swapover point of approximately -0.8 inches water gauge pressure in the annulus, was performed. This evaluation demonstrates that the annulus pressure would have remained negative during the transient. The swapover setpoint would have been reached at approximately 85 seconds using design basis assumptions. The maximum annulus pressure with respect to outside would have been approximately -0.4 inches water gauge. Therefore, the design basis objective (1) of keeping the air pressure within the annulus below atmospheric pressure at all times in which the integrity of the containment is required was met. EGTS discharge to the outside is slightly delayed by the event configuration but responds in approximately the same fashion as analyzed for the design basis. EGTS discharge flow peaks at the maximum flow rate for the short period followed by a varying discharge and then decreases to zero for a period of time before returning to match approximately the annulus inleakage flow rate.

As a result of the switch positioning, the EGTS fans would both start at the accident initiation, but would "deadhead" until one or both sets of standby isolation dampers opened.

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This short-term operation was not expected to cause either motor or fan damage based on a review of the fan flow and horsepower curve for the EGTS fan. Both controls being placed in standby would result in the potential for both control circuits attempting to control annulus pressure. This could result in one control being the lead and the other following or some "fighting" between the controls. Performance would be less than optimal with two controls attempting to control the same variable. This could manifest itself as annulus pressure variations about the setpoint. EGTS exhaust flow would have begun at approximately 94 seconds when the swapover setpoint was reached and the isolation dampers opened. Since the control pressure setpoint is the same for both control circuits, the annulus pressure and resultant inleakage would not deviate significantly from the design basis value of 250 cfm. Data taken during pre-operational testing would imply a maximum inleakage of 500 cfm even in a worst case. In addition, Case 2 (1000 Effective Full Power Days) of sensitivity study in WBNTSR-073, Revision 2, performed as part of the WBN design basis examines failure of one EGTS controller. This analysis demonstrated that offsite and control room doses were within regulatory dose limits. Based on the handswitch mis-configuration present and existing dose analyses, it is concluded that design basis objective 2 of reducing the concentration of radioactive nuclides in annulus air that is released to the environment during a LOCA would be met.

This handswitch configuration does not impact either design basis objective 3 or 4 above. WBN TSs contain several surveillances to assure EGTS is capable of accomplishing the design basis objectives. Surveillance Requirement (SR) 3.6.9.4 requires an 18 month test on a staggered basis to verify each EGTS train produces a flow rate of 4000 cfm (+/- 10 percent) within 20 seconds from the initiation of a Containment Isolation Phase A signal. This test assures the fans start and achieve capacity in the required timeframe. The mispositioned switch would not impact the fan start but would prevent reaching design flow until the standby isolation dampers had opened. Since the damper opening is based on pressure need and since the swapover logic is based on pressure need, the design basis objective of fan flow within the required time (although within approximately 94 seconds rather than 20 seconds) to limit offsite dose would have been met. In actuality, the initial period of the annulus pressure transient is dominated by a time when the annulus pressure is more negative than the setpoint and inleakage and temperature related effects are slowly raising the pressure to less negative values.

SR 3.6.15.4 provides additional testing requirements on the EGTS performance. It requires that the flow of 4000 (+/- 10 percent) produces an annulus pressure equal to or more negative than -0.61 in water gauge at elevation 783 with respect to atmosphere and with an inleakage of less than or equal to 250 cfm. The pressure requirement assures that under the worst air density conditions (cold air - winter conditions) that the annulus will remain below -0.25 in water gauge at the top of the annulus. The -0.25 inch water value assures that wind effects on the containment building will not result in exfiltration of fission products. The -0.61 inch water value assures the elevation head of the air from the top of the annulus to the measurement point is considered when assuring the -0.25 value is achieved. The differential between upper annulus and measurement point is then approximately 0.36 inches water. Applying this to the maximum pressure from the sensitivity case gives a maximum annulus pressure at the top of the annulus which is

negative, although less than the desired -0.25 inch. Existing sensitivity cases performed for the purpose of analyzing failure of the normal annulus vacuum control (i.e., starting the annulus at 0.0 inch pressure rather than -5.0 inch) bound the EGTS discharges that would be experienced by temporarily exceeding the -0.25 inch value at the top of the annulus. This study shows that the offsite and control room doses do not exceed regulatory limits.

It is concluded that the EGTS would have performed each of the four design objectives with the auto/standby switch mispositioned. Since no "auto" control existed, this event would be bounded by assuming the "preferred" EGTS train was non-functional.

B. **Evaluation of Personnel Performance**

SI 0-SI-65-6-B, "EGTS Train B 10 Hour Operation." This SI requires manual startup and shutdown of B train EGTS using SOI-65-02. The SI initiator was not the same person who was responsible for its completion. When the 10-hour EGTS run was complete, the second unit operator performed SOI-65.02, Section 7.2, to shutdown EGTS Train B. The last step of this section directs the performer to Section 5.1 to align EGTS in the "Standby Readiness" lineup, if required. Although it was subsequently determined that the operator knew this lineup was required and some dampers manipulations were performed using the main control room copy of the SOI, this section was not completely performed nor were the completed steps of this section formally documented. However, the operator signed a step in the SI package indicating that the system was aligned in standby and a similar step in the SOI package was marked not applicable. Had the operator completed SOI-65-02, Section 5.1, the switches would have been placed in the proper position.

Subsequent control board walkdowns by operators focused on alarm status and open work items against equipment with no specific review aid for checking infrequently manipulated controls such as EGTS handswitches.

C. **Safety Significance**

This event occurred with Unit 1 in normal operation at 43 percent reactor power. The most severe conditions would have been during a design basis loss of coolant accident (LOCA). The impact of having both handswitches in the A-Auto Standby position, is that EGTS airflows would not have met the SR for full flow time response of 20 seconds.

In review of calculation TI-ANL-166, both sets of dampers would have opened at about 85 seconds, which with the increase in damper leakage and both trains of fans operating, the SR inleakage limit of 250 CFM would have probably been exceeded. However, based on previous test data, it is estimated the flow would not have exceeded 500 cfm.

Engineering calculation WBNTSR-073 analyzed an EGTS exhaust flow of 1281 CFM after a LOCA initiation. This calculation demonstrates the higher stack flows anticipated for this postulated event would not have exceed the allowable offsite dose limits for a LOCA.

As for identifying and correcting the handswitch/pressure control valves (PCV) misalignment within one hour, there are two opportunities for operator actions which are credible. The first opportunity is early identification in the accident by operator response to the annunciation (EIIS Code ANN) for abnormal pressure controller which coincides with the opening of the PCVs at approximately 85 seconds. This operator response could possibly be delayed by the higher priority actions being performed by the operators during the initiation of LOCA mitigation.

The second opportunity would occur approximately 30 minutes into the accident when one train of EGTS is placed in standby per SOI-65.02, as directed by the Emergency Operating Instruction (E)-1. This action has extremely high probability for its performance in that it is directly required by the LOCA mitigation instructions.

Based on these reviews, it is concluded that with the most limiting accident for this event, the plant would have remained within regulatory limits and the health and safety of plant personnel and the public was never compromised.

V. CORRECTIVE ACTIONS

A. Immediate Corrective Actions

In addition to the immediate actions discussed in the Operator Action section above, a review of four other SIs performed by the individual on March 17, 1996, revealed no additional problems. The standby alignment for Auxiliary Building Gas Treatment System, Control Building HVAC, Radiation Monitoring Block switches, Containment Spray System, and Diesel Generator System was verified with no mispositioned switches found. In addition, a review of previous performances of 0-SI-65-6-A and 0-SI-65-6-B did not reveal any performance problems.

B. Corrective Actions to Prevent Recurrence

1. The unit operator was counseled regarding this event. In addition, the individual was required to review the following procedures and discuss them prior to returning to onshift duty:

   SSP-2.55, "Procedure Use and Adherence"
   SSP-12.01, "Conduct of Operations"
   SSP-12.06, "Verification Program"
   SOI-65.02, "Emergency Gas Treatment System"
   0-SI-65-6-B, "EGTS 10 Hour Operation"

2. SSP-8.02, "Surveillance Program," was revised to clarify the inclusion of supporting documentation in SI package.

3. The onshift crews are being briefed regarding this event with emphasis on the importance of following procedures and possible adverse consequences of not following procedures.

4. TVA has issued instruction, 1-PI-OPS-1-MCR, "Plant Instruction Main Control Room," to provide board walkdowns which stresses alignment of infrequently manipulated critical equipment.

VI. ADDITIONAL INFORMATION

A. Failed Components

1. Safety Train Inoperability

The A-Auto function of the EGTS was inoperable due to the misposition of these switches.

2. Component/System Failure Information

a. Method of Discovery of Each Component or System Failure:

As discussed previously, a system engineer identified the switch misalignment while observing the position of EGTS handswitches.

b. Failure Mode, Mechanism, and Effect of Each Failed Component:

The switches were in the wrong position.

c. Root Cause of Failure:

Personnel Error - The misalignment of the switches as previously discussed was caused by a failure to follow procedure.

d. For Failed Components With Multiple Functions, List of Systems or Secondary Functions Affected:

No other functions were affected.

e. Manufacturer and Model Number of Each Failed Component:

Westinghouse Type W-2

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B. **Previous Similar Events**

For Watts Bar Nuclear Plant, no similar events have been previously reported under 10CFR50.72 or 10CFR50.73.

VII. COMMITMENTS

The actions taken in response to this event are tabulated in Section V, Corrective Actions. These actions are complete with the exception of one last operating crew briefing scheduled to be completed by May 3, 1996.